

KEYS TO THE SUB-FAMILIES AND THEIR GENERA OF THE NON-TIBIAROLIATE GROUP OF ASSASSIN BUGS (HETEROPTERA: REDUVIIDAE) OF SOUTHERN INDIA¹

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Keys for non-tibiaroliata group of Reduviidae, namely Harpactorinae, Stenopodainae, Tribelocephalinae, Saicinae, Emesinae, Holoptilinae, and their 37 genera from Southern India have been given. Significant variations in their antennae, rostrum, head, pronotum, scutellum and appendicular chaetotaxy have been considered for the preparation of the keys.

INTRODUCTION

In his account on the reduviid fauna of the then British India, including Ceylon and Burma, Distant (1903, 1910) had relied upon collections deposited in various repositories abroad and very few species from southern India were represented. After Distant (1910), the first significant contribution on the taxonomy of Indian Reduviidae was made by Wygodzinsky (1966) by describing 5 genera and 8 species, in his monograph of Emesinae.

Apart from this, the taxonomic contributions of Indian Reduviidae are limited to the descriptions of a few species of Harpactorinae by Samuel and Joseph (1953). Subsequently, Muraleedharan (1976) described two new species of *Henricohahnia*. Years later, Wygodzinsky and Lent (1980), Ambrose and Livingstone (1986a), Livingstone and Murugan (1987) and Livingstone and Ravichandran (1988) added about half a dozen more species to the list of Reduviidae from southern India.

The first attempt in preparing a key for the genera of Reduviidae of the oriental region was made by Cook (1977) on Ectrichodiinae and since then it was desired to have a key for the genera of all the sub-families of the reduviid fauna of southern India.

At present, 168 species belonging to 65 genera and 11 sub-families of Reduviidae have been recorded from southern India and they are divisible into two major categories on the basis of the presence or absence of tibiariolum on the fore and mid tibiae or fore tibiae alone. The term 'tibiariolum' was coined by Mac-Gillivray (1923) to designate a pad like structure, similar to an

'arolium', at the distal end of tibiae, having been densely packed with fine hairs. Subsequently, the term 'Fossula spongiosa' (Miller 1938) and 'tibial pad' (Livingstone and Ambrose 1978) were coined to designate the same structure and Distant (1903) used the term 'spongy furrow'. The term tibiariolum is found to be more appropriate and in the present key, those sub-families without such a structure have been considered.

In his classification of Reduviidae, Distant (1903) enumerated 12 sub-families including Nabidinae. Later, China and Miller (1959) and subsequently Davis (1966), recognised 29 sub-families of Reduviidae from all over the world. Since, in the present collection of Reduviidae of southern India, only a few sub-families have been represented, it is preferred to adopt the classification of Distant. The non-tibiaroliata group of Reduviidae includes 6 sub-families, namely Harpactorinae, Stenopodainae, Tribelocephalinae, Emesinae, Holoptilinae and Saicinae.

There are 37 genera and 93 species recorded so far under this group in this region, of which 1 genus and 18 species are reported new to science and a number of species new records from southern India. The genus *Neohaematorrhophus* which was originally described under Ectrichodiinae by Ambrose and Livingstone (1986b) has characters suggestive of Harpactorine affinity and therefore it is also included under Harpactorinae. The keys for the genera have been prepared only for those sub-families that are represented by more than two genera.

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KEY TO THE SUB-FAMILIES OF THE NON-TIBIAROLIATE GROUP OF REDUVIIDAE OF SOUTHERN INDIA

1. Ocelli present2
Ocelli absent3
2. Antennae and legs featheryHoloptilinae Stal
Antennae either finely setaceous or longly pilose5
3. First segment of the antennae incrassated, rostrum slender, elongate and elbowed at the junction of the first and second segments; clypeal process correctly produced in frontTribelocephalinae Stal
First segment of the antennae not incrassated; rostrum curved, second joint swollen or not swollen4
4. First segment of the antennae elongate, and setaceous; second segment of the rostrum invariably swollen; pronotum longly spinous, fore coxae not elongate, fore tibia almost as long as the fore femoraSaicinae Stal
First segment of the antennae elongate, either setaceous or longly pilose; second segment of the rostrum either straight or swollen, fore coxae very elongate; fore femora incrassated and spinous; fore tibia invariably shorter than fore femoraEmesinae Stal
5. Frontal forked tubercles correctly produced; ocelli large, projecting outward; ante-ocular area invariably longer than post-ocular area; prosternal spine when present; correctly produced; ante-ocular area parallelStenopodainae Stal
Frontal tubercles rarely present, ocelli moderately large, wide apart; ante-ocular area conical, tapering anteriorly...
..... Harpactorinae Stal

KEY TO THE SOUTH INDIAN GENERA OF EMESINAE

1. Pronotal posterior lobe elongate, cylindrically produced, body elongate, setaceous*Stenolemus* Signoret
Pronotum either almost uniformly elongate (or) subglobose; body invariably smooth2
2. All the three segments of the thorax equally elongate, cylindrical; apterous *Ischnobaenella* Wygodzinsky
Thoracic segments invariably globose, either alate or apterous3
3. Fore trochanteral spine present; fore femora with biseriate spines *Ploiaria* Scopoli
Fore trochanteral spine absent (or) setaceous; fore femora with single seriate long and short spines (or) with uniformly long spines 4
4. Fore trochanter setaceous; second rostral segment short, bulbous; body longly pilose, hemelytra embossed.....
.....*Emesopsis* Uhler
Second rostral segment not bulbous; foreleg tarsomeres either two segmented (or) three segmented5
5. Foreleg tarsomeres two segmented and one fourth to one fifth as long as tibiae; appendages banded; wings highly spotted.....*Empicoris* Wolff.
Foreleg tarsomeres three segmented.....6

6. First rostral segment as long as second; first tarsal segment more than twice as long as second and third combined
..... *Bagauda* Bergroth
First rostral segment as long as second; first tarsal segment longer than second (or) third *Gardena* Dohrn

KEY TO THE SOUTH INDIAN GENERA OF STENOPODAINAE STAL

1. Fore femora incrassated and ventrally armed..... 2
Fore femora either slender (or) slightly incrassated but unarmed4
2. Ventrolateral margin of the ante-ocular area (loral lobes) expanded and armed with three to four strong robust spines*Staccia* Stal
Ventrolateral margin of the ante-ocular area (loral lobes) not expanded and not spined 3
3. Posterolateral angles and anterolateral angles of the pronotum tuberculate; scutellum prominently tuberculate; propleural anterior spines obscure.....*Oncocephalus* Klug
Anterior lobe of the pronotum non-tuberculate, longer than posterior lobe; propleural spines elongate, correctly produced; scutellar tubercles obscure
.....*Sastrapada* Amyot & Serville
4. Fore and mid tibiae ventrally with elongate pad like structure; femora with mid ventral comb like setae; first segment of the rostrum almost half as long as the ante-ocular area; anterior lobe of the pronotum with sharply pointed spine, anterolateral and posterolateral angles and scutellum heavily spined *Canthesancus* Amyot & Serville
Fore and mid tibiae slender; scutellum either tuberculate (or) non-tuberculate; first antennal segment short and incrassated or elongate and slender; anterior area of the pronotum tuberculous (or) non-tuberculous5
5. Entire head, thorax, body, totally unarmed; propleural anterior spine absent *Hemisastrapada* gen. nov.
Body invariably tuberculate or spined; propleural spine either tuberculate or spinous6
6. First segment of the rostrum reaching almost the middle of the post-ocular area; propleural spines elongately correctly produced; post genal row of tubercles, sometimes forked
..... *Pygolampis* Germ.
Propleural spine either tuberculate (or) obscurely spinous, antenniferous tubercles, frontal tubercles, correctly produced; first rostral segment not reaching (or) almost reaching the eyes; first joint of antennae either short and incrassated or elongate and pilose; anterior lobe of pronotum either tuberculate (or) carinate7
7. First antennal segment elongate and pilose; anterior lobe of the pronotum tuberculate; anterolateral and posterolateral angles spinously produced; scutellum elongately, correctly spinous *Bardesanes* Distant
Scutellum either elongately spinous or with nodule like tubercle; first antennal segment short and incrassated; anterior lobe sparingly tuberculate (or) carinate8

8. Anterior lobe of the pronotum tuberculate; anterolateral and posterolateral angles moderately spinously produced; occiput with a pair of occipital, posteriorly developed warty tubercles; scutellum spinously produced *Caunus* Stal
Anterior lobe of pronotum non-tuberculate but faintly carinate; anterolateral and posterolateral angles non-spinous; scutellum with nodulose tubercles; post gena with a prominent ventrally directed tubercle *Diaditus* Stal

10. Discal area of posterior lobe of pronotum slightly angulate; spine at the base of antennae nodulose; first rostral segment as long as second and third combined... *Serendiba* Distant
Posterior lobe of pronotum not angulated; spine at the base of antennae short, but sharply pointed; first segment of the rostrum almost as long as second and third combined
..... *Endochus* Stal

11. Spine at the antennal base present; scutellum without spine12
Head bare, scutellum with or without spine13

12. Femora nodulose; first segment of the rostrum much shorter than second; spine at the base of antennae very much elongated and curved outward *Macracanthopsis* Reuter
First segment of the rostrum longer than second segment; spine at the antennal base short and straight; femora not nodulose..... *Cydnocoris* Stal

13. Scutellum with robust spine pointing vertically upward; collar cylindrical, much elongate; larger in size.....
..... *Sycanus* Amyot & Serville

- Apex of the scutellum pointed but not spinous; collar very short; ante- and post-ocular areas either sub-equal (or) the former more elongate 14

14. Ante-ocular area almost twice as long as post-ocular area, first rostral segment obscure; second rostral segment elongate, straight..... *Lophocephala* Laporte

- First rostral segment a little shorter than the second segment; ante- and post-ocular areas sub-equal; anterior angles of the pronotum either tuberculate or smooth 15

15. Anterior lobe of the pronotum posteriorly truncated at the middle; antero-lateral angles obscurely tuberculous; scutellum posteriorly acutely pointed to tuberculate; lateral angles of the posterior lobe of pronotum expanded as paranotal lobe *Coranus* Curtis

- Pronotal anterior lobe globose, either smooth or rugulose, antero-lateral angles of the pronotum with moderately developed tubercles; scutellum very minute bearing a median and lateral angulations 16

16. Fore and mid femora highly incrassated with fine tubercles on the ventral side; ante-ocular area slightly longer than post-ocular area
..... *Neohaematorrhophus* Ambrose & Livingstone

- Fore and mid femora not incrassated and tubercles absent on the ventral side; ante- and post-ocular areas sub-equal (or) the latter slightly more elongate 17

17. Anterior lobe of pronotum smooth, small and more globose; ante- and post-ocular areas sub-equal; scutellum non-tuberculate; posterior lobe of the pronotum almost smooth (or) finely granulate; small in size..... *Sphedanolestes* Stal

- Ante-ocular area a little longer than post-ocular area; anterior lobe of pronotum with carinations and sulcations on either side; posterior lobe rugulose, scutellar tubercles slightly curved upward; large size *Rhinocoris* Hahn

KEY TO THE SOUTH INDIAN GENERA OF HARPACTORINAE STAL

1. Ocelli present 2
Ocelli absent *Rhaphidosoma* Amyot & Serville
2. Pronotal spines present 3
Pronotal spines absent 11
3. Posterior lobe of the pronotum with discal spines 4
Posterior lobe of pronotum without discal spines 9
4. Scutellar spines present 5
Scutellar spines absent 6
5. Scutellum apically with a single spine; body absolutely bare; head bare but for a nodule like tubercle at the base of each antenna *Occamus* Distant
Scutellum with a median dorsal spine in addition to apical spine; pronotum, head and appendages highly spinous; spines at the base of antennae elongately produced
..... *Polididus* Stal
6. Anterior lobe of the pronotum armed 7
Anterior lobe of the pronotum unarmed (or) obscurely tuberculate 8
7. Anterior lobe of pronotum with only the discal spines; head unarmed, but for short spine at the base of each antenna, legs unarmed *Brassivola* Distant
Anterior lobe of pronotum with a pair of long discal spines on each half, head highly spinous, with a very long spine at the base of each antenna; fore femora nodulose and highly spinous on each nodule *Irantha* Stal
8. Anterior lobe of pronotum with nodulose tubercles all around; spine at the base of each antenna very much elongate *Platerus* Distant
Anterior lobe of the pronotum without nodulose tubercles, but rugulose; spine at the base of antennae pointed, but short *Lanca* Distant
9. First rostral segment not passing the eyes; base of the antennae without spines; ante- and post-ocular areas almost sub-equal; spines of the lateral angles of the pronotum elongate and slender *Euagoras* Burmeister
First segment of the rostrum passing the eyes; spine at the base of each antenna moderately developed; ante-ocular area much shorter than post-ocular area 10

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REFERENCES

- AMBROSE, D.P. (1985): Assassin bugs of Tamil Nadu and their Role in Biological Control (Insecta-Heteroptera-Reduviidae). *Proc. Natl. Sem. Entomoph. Ins.* pp. 16-28.
- AMBROSE, D.P. & LIVINGSTONE, D. (1986a): A new species of *Rhinocoris* (Fabricius) from Southern India (Heteroptera: Reduviidae: Harpactorinae). *J. Bombay nat. Hist. Soc.*, 83 (1): 173-177.
- AMBROSE, D.P. & LIVINGSTONE, D. (1986b): A new genus of Ectrichodiinae from Southern India (Insecta: Heteroptera: Reduviidae). *J. Bombay nat. Hist. Soc.* 83 (2): 401-406.
- CHINA, W.E. & MILLER, N.C.E. (1959): Checklist and keys to the families and sub-families of the Hemiptera: Heteroptera. *Bull. British Mus. (Nat. Hist.) Entomol.* 8: 1-45.
- COOK, M.L. (1977): A key to the genera of Asian Ectrichodiinae (Hemiptera: Reduviidae) together with a Check List of genera and species. *Oriental Insects*, 11 (1): 63-68.
- DAVIS, N.T. (1966): Contributions to the morphology and phylogeny of the Reduviidae (Hemiptera: Heteroptera) Part III. The male and female genitalia. *Ann. Entomol. Soc. Amer.* 59(5): 911-923.
- DISTANT, W.L. (1903): The Fauna of British India including Ceylon and Burma, Rhynchota Vol. II. Heteroptera. Taylor and Francis, London, pp. 196-402.
- DISTANT, W.L. (1910): The Fauna of British India including Ceylon and Burma, Rhynchota Vol. V, Heteroptera: Appendix. Taylor and Francis, London, pp. 169-220.
- JOSEPH, M.T. (1959): Biology and Bionomics and Economic importance of some reduviids collected from Delhi. *Indian J. Ent.* XXI(1): 46-58.
- LIVINGSTONE, D. & AMBROSE, D.P. (1978): Biology, Ecophysiology and Ethology of the reduviids of the scrub jungles of the Palghat-Gap, India. *J. Madras Univ.* 4 (3): 97-118.
- LIVINGSTONE, D. & MURUGAN, C. (1987): A new genus of Ectrichodiinae from Point Calimere, Southern India (Heteroptera: Reduviidae) *Uttar Pradesh J. Zool.* 7(1): 92-95.
- LIVINGSTONE, D. & RAVICHANDRAN, G. (1988): A new species of *Tribelocephala*, Stal (Heteroptera: Reduviidae: Tribelocephalinae), from Western Ghats. *ibid* 8 (1): 100-102.
- MACGILLIVRAY, A.D. (1923): External Insect Anatomy: A guide to the study of insect Anatomy and an Introduction to Systematic Entomology. Urbana III.
- MILLER, N.C.E. (1938): Function of fossula spongiosa in Reduviidae. *Nature*, London. April, 749-750.
- MURALEEDHARAN, N. (1976): Two new species of *Henricohahnia* from India (Heteroptera: Reduviidae: Harpactorinae). *Oriental Insects* 10(1): 51-54.
- SAMUEL, C.K. & JOSEPH, M.T. (1953): On two new forms of Reduviids collected from Delhi (India). *Indian J. Ent.* 15 (1): 29-32.
- WYGODZINSKY, P.W. (1966): A monograph of the Emesinae (Reduviidae: Hemiptera), *Bull. Amer. Mus. Nat. Hist.* 133. 1-614.
- WYGODZINSKY, P.W. & LENT, H. (1980): Description of one new Monotypic Genus of Reduviidae from Panama and two from Southern India (Hemiptera: Reduviidae). *Rev. Brasil. Biol.* 40(4): 733-742.